

Economic and Social Commission for Asia and the Pacific

**IMPLEMENTATION
OF THE
CLEAN DEVELOPMENT MECHANISM
IN ASIA AND THE PACIFIC**

ISSUES, CHALLENGES AND OPPORTUNITIES



UNITED NATIONS

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UNITED NATIONS
New York, 2003

ST/ESCAP/2292

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PREFACE

Change is the essence of evolution. But the change in recent years has been much faster and unforeseen, which is a matter of concern. Climate change and global warming attributed to emissions of greenhouse gases (GHGs) from human activities are a major threat to our survival and well-being. The United Nations Framework Convention on Climate Change (UNFCCC) mooted at the Earth Summit in 1992 is a landmark agreement of the global community to meet the challenge of climate change. In 1997, the Kyoto Protocol set the targets and time tables for the reduction of emissions to implement the Convention.

GHG emissions are the product of complex dynamic systems dictated by socio-economic conditions and technological change. The Intergovernmental Panel on Climate Change (IPCC) has developed various scenarios to represent the driving forces and emissions based on available scientific knowledge. IPCC has been involved in analysis of technologies and measures for the abatement of GHG emissions in various sectors, including agriculture, energy, forestry, housing, industry, transport and waste management. These options and opportunities deserve serious consideration in the pursuit of sustainable development, even without the threat of climate change.

The Clean Development Mechanism (CDM), one of the three "flexibility mechanisms" pronounced in the Kyoto Protocol, has the potential to garner additional sources of financing sustainable development projects in developing countries along with the global reduction of GHG emissions.

This publication provides a synoptic overview of the various issues relating to climate change abatement initiatives with specific reference to the issues, challenges and opportunities for the effective implementation of the CDM in countries of Asia and the Pacific.

The publication is intended to provide a ready reference to the development that has so far taken place, the modalities and procedures for participation in the CDM and the issues which need to be addressed for tapping its potential.

It is hoped that this publication will help decision makers, policy analysts and others concerned with the CDM process to ponder over the perceived barriers and opportunities of CDM which may open up ways and means for a "collective development mechanism" through cooperation at various levels.

ABBREVIATIONS

AA	assigned amount
AAU	assigned amount unit
ADB	Asian Development Bank
AIJ	activities implemented jointly
ALGAS	Asia Least Cost Gas Abatement Strategy
CDM	Clean Development Mechanism
CER	certified emission reduction
CFC	chlorofluorocarbon
CH ₄	methane
CO ₂	carbon dioxide
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ERU	emission reduction unit
EU	European Union
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
JI	joint implementation
LULUCF	land use, land-use change and forestry
MOP	Meeting of the Parties
PCF	Prototype Carbon Fund
PDD	project design document
N ₂ O	Nitrous Oxide
OECD	Organisation for Economic Cooperation and Development
PFC	perfluorocarbon
SF ₆	sulphur hexafluoride
SRES	Special Report on Emission Scenarios
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization

I. INTRODUCING THE CLEAN DEVELOPMENT MECHANISM: GENESIS AND RATIONALE

A. Objectives of the Mechanism

Clean Development Mechanism (CDM) is an economic instrument for inducing initiatives to meet the challenges faced by the impending threat of climate change. It is a mechanism for promoting technology transfer and investment from developed countries to the developing countries for projects to reduce the emissions of Greenhouse Gases (GHGs). The mechanism allows the governments or private parties of developed countries to make investment for emission reduction projects in developing countries and, in turn, get the benefit in terms of “Certified Emission Reduction (CER)” which could be credited against their national emission reduction targets. Thus, CDM is intended to serve the dual purpose of assisting the developing countries in their pursuits for sustainable development as well as providing an opportunity to the developed countries for contributing towards reduction of global concentrations of greenhouse gases at lesser cost. In essence, CDM has opened a window to suit the interest of both the developed and developing countries.

B. Background of the Mechanism

The concept of CDM owes its origin to the Kyoto Protocol (1997) under the UN Framework Convention on Climate Change (UNFCCC) mooted at the United Nations Conference on Environment and Development (Earth Summit) in 1992. The Convention on Climate Change and the follow-up initiatives were prompted by the increasing evidence of global warming triggered by anthropogenic emissions of Greenhouse Gases (GHGs) which include Carbon Dioxide, Nitrous Oxide, Methane, Halogenated Hydrocarbon and Tropospheric Ozone. Burning of fossil fuels, agriculture, industrial operations and deforestation due to various human activities are known to cause the GHG emissions which have significantly increased over the years. Although the sensitivity of climate system to GHG emissions is not yet well known, the evidence suggests that there is discernible human influence on climate change. According to an assessment, doubling of carbon dioxide concentration in the atmosphere or an equivalent increase of a mixture of greenhouse gases can cause 1.5 to 4.5°C rise in global temperature with associated impacts such as sea level rise, floods and droughts.

C. Intergovernmental Panel on Climate Change

To elicit scientific information and advice for policy decisions based on assessment of available knowledge relating to causes and consequences as well as preventive and mitigative measures, an Intergovernmental Panel on Climate Change (IPCC) was set up in 1988 under the aegis of the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO). The IPCC, consisting of subject matter specialists from different parts of the world, has developed various scenarios based on available scientific knowledge. The IPCC has also been involved in analysis of technologies and measures to reduce the GHG emissions in various sectors including agriculture, energy, forestry, housing, industry, transport and waste management. Since its establishment, the IPCC has produced a

series of assessment reports (1990, 1995 and 2001), special reports, technical papers and methodologies.

D. United Nations Framework Convention on Climate Change

The IPCC in its first report of 1990, the findings of which have been further substantiated in subsequent reports, cautioned that the increasing emissions of greenhouse gases from human activities would cause “additional warming of the Earth’s surface” unless measures are taken to reduce the emissions. Recognizing the threat of climate change, the IPCC called for an international treaty for facing the challenge at the global level. The need for concerted action by the global community was also raised at the Second World Climate Conference (1990) organized by the World Meteorological Organisation (WMO). In response to the recommendation of these specialist bodies, the United Nations General Assembly (UNGA) set up an Intergovernmental Negotiation Committee for formulation of the treaty. Based on negotiation during 1991-92, the text for the United Nations Framework Convention on Climate Change (UNFCCC) was finalized in May, 1992 and placed at the United Nations Conference on Environment & Development (UNCED) in June 1992 for signature and subsequent ratification by the member countries.

The UNFCCC aims at stabilization of greenhouse concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. According to the UNFCCC, “such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner”. The guiding principles laid down by the UNFCCC include the following:

➤ The parties should protect the climate system on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country parties should take the lead in combating climate change and the adverse effects thereof;

➤ The specific needs and special circumstances of developing country parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those parties, especially developing country parties, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration;

➤ The parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost; and

➤ The parties should cooperate to promote a supportive and open international economic growth and development in all parties, particularly developing country parties, thus enabling them better to address the problems of climate change.

E. Kyoto Protocol

While stipulating the commitments of countries as needed for implementation of the Convention, the UNFCCC laid down various other requirements. Recognising the need for provision of financial resources on a grant or concessional basis, including for the transfer of technology, the UNFCCC defined the broad guidelines and called for modalities to be finalized by the Conference of Parties (COP) established through the Convention. After detailed deliberations in the following years, the modalities for implementation of the Convention were finalized in 1997 through an international agreement at Kyoto, Japan.

F. Emission reduction targets

The agreement, popularly known as Kyoto Protocol (1997), sets the targets and timetables for reduction of emissions by the developed countries. The Convention encourages the developed countries to stabilise their GHG emissions and the Kyoto Protocol commits them to reduce their collective emissions by at least 5 per cent. According to the Protocol, 38 developed countries will have to reduce their GHG emissions to an average of 5.2 per cent below their 1990 levels over the period of 2008-2012 which is defined as the first commitment period. The Protocol urges the countries to make “demonstratable progress” towards this goal by 2005 and meanwhile talks on targets for the second commitment period are required to be initiated. The Protocol will become legally binding when at least 55 countries, including the developed countries contributing 55 per cent of the developed countries’ 1990 Carbon Dioxide emissions, have ratified it.

The Kyoto Protocol has identified Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrofluorocarbons (HFC), Perfluorocarbons (PFC) and Sulphur Hexafluoride (SF₆) as the six main greenhouse gases for setting the targets. The Protocol allows the option to the countries to decide which of these gases will constitute their emission reduction programme. Thus, these gases are combined in a ‘basket’ so that reduction in each gas are credited to a single target number. Since these gases have different Global Warming Potential (GWP), the reductions in individual gases are computed as ‘carbon dioxide equivalent’ for arriving at one figure. According to the Protocol, the reduction in emissions of Carbon Dioxide, Methane and Nitrous Oxide will be measured against the base year of 1990 barring some countries with economies in transition. For Hydrofluorocarbons, Perfluorocarbons and Sulphur Hexafluoride, the reductions can be determined against 1990 or 1995 as the baseline. Chlorofluorocarbons which constitute a major group of greenhouse gases are not included in the Protocol since these are already covered through the phase-out programme under the Montreal Protocol on Ozone Depleting Substances. Among the six gases identified in the Protocol, Carbon Dioxide is the most important one since it accounted for more than four fifths of total greenhouse gas emissions from developed countries in 1995. Besides, reduction of Carbon Dioxide emissions from fuel combustion, activities in the Land-use, Land-use Change and Forestry Sector (LULUCF) such as afforestation and reforestation which help absorption of Carbon Dioxide are also included in the Protocol. (Box1.1)

Box 1.1
Greenhouse gases and sectors/sector categories
Annex A of the Kyoto Protocol

Greenhouse gases

Carbon Dioxide (CO₂)
Methane (CH₄)
Nitrous oxide (N₂O)
Hydrofluorocarbons (HFCs)
Perfluorocarbons (PFCs)
Sulphur hexafluoride (SF₆)

Sectors/Source Categories

Energy

Fuel combustion

Energy industries
Manufacturing industries and construction
Transport
Other sectors
Other

Fugitive emissions from fuels

Solid fuels
Oil and natural gas
Other

Industrial processes

Mineral products
Chemical industry
Metal production
Other production
Production of halocarbons and sulphur hexafluoride
Consumption of halocarbons and sulphur hexafluoride
Other

Solvent and other product use

Agriculture

Enteric fermentation
Manure management
Rice cultivation
Agricultural solids
Prescribed burning of savannas
Field burning of agricultural residues
Other

Waste

Solid waste disposal on land
Wastewater handling
Waste incineration
Other

G. Mechanisms for emission reduction

While the Kyoto Protocol identified a number of modalities for implementation of the Climate Change Convention and the Protocol, further negotiations in several rounds of the Conference of Parties (COP) were held to develop the operational details. As a result, in the 7th Conference of Parties, a comprehensive rule book known as the Marrakech Accords (2001) has been prepared and the Accords also provide clarification to help ratification by the countries.

The Kyoto Protocol as further clarified through the Marrakech Accords has recognized the following cooperative mechanisms to help the developed countries (enlisted as Annex I Parties) for meeting their emission reduction targets:

1. Emission trading (ET)

Through this mechanism, countries are entitled to transfer parts of their allowable emission termed as “Assigned Amount Units (AAU)”.

2. Joint implementation (JI)

Under this mechanism, countries can claim credit for emission reduction accrued from investment in other developed countries and thereby transfer of equivalent “Emission Reduction Units (ERU)” is permitted between these countries.

3. Clean Development Mechanism (CDM)

Through this mechanism, the investors from developed countries can take up emission reduction projects which help sustainable development in developing countries and thereby earn “Certified Emission Reductions (CERs)” to be used for achieving compliance of their quantified emission reduction commitments.

As a forerunner to CDM and JI, some pilot projects have been undertaken in developing countries through an interim mechanism entitled “Activities Implemented Jointly (AIJ)”. However, under this mechanism no credit is accrued for the emission reduction.

The aforesaid mechanisms are based on the premise that the countries including the government and private organizations that find it expensive to reduce emissions in their countries can pay for emission reduction elsewhere at lesser cost. Thus, the investment cost is reduced while the targets of global emission reduction is achieved. However, according to the Protocol, the credit earned through emission reduction in other countries should be supplementary to the in-country emission reduction. The emission trading regime opens a market whereby countries which are able to reduce emissions more than their agreed targets will be entitled to sell the excess credits to other countries. The Joint Implementation (JI) mechanism offers an opportunity for financing projects in other countries. For instance, if a country is unable to reduce its emissions at a lesser cost, it may choose to invest in emission reduction projects in another country. Thus, it gets the credit without incurring heavy expenditure while the recipient country benefits from foreign investment and technology

transfer. It amounts to a “win-win-win” scenario where both the countries are gainers and the global emission reductions are met.

While the Emission Trading (ET) and Joint Implementation (JI) projects are confined to developed countries with defined emission reduction targets, the Clean Development Mechanism (CDM) offers a new avenue for emission reduction in developing countries which do not have any obligatory emission reduction target. Thus, CDM increases the overall emissions cap. As per stipulations made in the Protocol, the CDM will be implemented through an Executive Board and emission reductions are to be certified by designated independent organizations. For certification, the CDM projects should have approval of the concerned parties, demonstrate a measurable and long term ability to reduce emissions and involve reductions that would be additional to what would otherwise take place. A share of proceeds from CDM projects will be used for administrative expenses and to help the most vulnerable developing countries for meeting the cost of adaptation to climate change impacts.

H. Rationale for the Mechanism

The CDM projects are to assist the developing countries in achieving sustainable development through investment from developed countries (governments as well as private companies). Thus, the CDM projects are expected to help the developing countries in activities that will lead to their economic, social and environmental benefits. Clean water and air, employment, poverty alleviation and energy efficiency are among the multiple gains that could be derived through this mechanism. For the developing countries which are in need of additional funding and technology transfer to achieve sustainable development, the CDM promises a new opportunity and incentive not only for meeting their basic human needs but also for their active participation in global GHG reduction initiatives. (Box 1.2 and Box 1.3)

Box 1.2

Benefits and beneficiaries of the CDM

The CDM has the potential of multi-faceted benefits and multiple beneficiaries which include the following:

Benefits

- Global reduction of greenhouse gases.
- Lesser cost of climate change mitigation.
- Additional benefits through reduction of other pollutants besides GHGs.
- Opening a market for carbon investment.
- Additional financial resources and alternative technologies.
- Initiatives for adaptation to climate change impacts.
- Focus on sustainable development.
- Scope for cooperation at various levels (national, sub-regional, regional and global).

Beneficiaries

- Developed countries.
- Countries with economy in transition.
- Developing countries.
- Small inland countries.
- Public sector.
- Private sector.

Box 1.3

Genesis of the CDM: a chronology

- 1988 : Inter-Governmental Panel on Climate Change (IPCC) constituted.
- 1990 : First report of IPCC published.
- 1990 : World Climate Conference.
- 1991 : Inter-Governmental Negotiations Committee set up by the United Nations General Assembly for formulation of international treaty.
- 1992 : UN Framework Convention on Climate Change (UNFCCC) finalized and placed for signatures of countries at the Earth Summit.
- 1995 : First Conference of Parties (COP-1) in Berlin.
- 1996 : Second Conference of Parties (COP-2) in Geneva.
- 1997 : Third Conference of Parties (COP-3) in Kyoto adopted the Kyoto Protocol for implementation of UNFCCC and defines the Clean Development Mechanism (CDM).
- 1998 : Fourth Conference of Parties (COP-4) in Buenos Aires.
- 1999 : Fifth Conference of Parties (COP-5) in Bonn.
- 2000 : Sixth Conference of Parties (COP-6) in Hague.
- 2001 : Seventh Conference of Parties (COP-7) in Marrakech formulates a rulebook (Marrakech Accords) on modalities for implementation of the Convention and its Protocol including CDM.
- 2002 : Eighth Conference of Parties (COP-8) in New Delhi reviews status and takes decisions for further action on CDM.

II. PARTICIPATION IN THE CLEAN DEVELOPMENT MECHANISM: MODALITIES AND PROCEDURES

A. CDM project cycle

The CDM is an innovative market based instrument for financing projects in developing countries. It provides a means to the investors for promoting sustainable development while curbing the GHG emissions below the “business as usual” levels. It offers opportunities for the government as well as private sector investment. Yet another distinctive feature of the CDM relates to the “bottom-up” approach for project development involving public/stakeholders' scrutiny (Box 2.1). The CDM project cycle entails seven basic stages: project design and formulation, national approval, validation and registration, project finance, monitoring, verification/certification and issuance of “Certified Emission Reduction (CERs)”. The first four stages are performed prior to implementation of a project, while the latter three are undertaken during life time of the project.

Box 2.1

What is innovative about the CDM?

- Provides market-oriented means to promote sustainable development (SD) while reducing GHG emissions below what they would have otherwise been.
- Promotes private sector investment in SD (as distinct from ODA).
- Provides for "bottom-up approach" regarding project development.
- Involves public scrutiny.

Source: Christine Zumkeller, UNFCCC, Secretariat

B. Prerequisites for participation

The Convention and the subsequent negotiations including Kyoto Protocol which laid down the financial mechanisms, recognized the principle of ‘Common but differentiated responsibilities’ considering the social and economic capabilities of developing and developed countries. Accordingly, the countries have been grouped into three categories with differentiated responsibilities.

➤ Annex – I: consists of 24 member countries of the Organisation for Economic Cooperation and Development (OECD), the European Union (EU) and countries undergoing transition to a market economy. These countries are committed to limiting their anthropogenic emissions of GHG, and enhancing their sinks and reservoirs for GHG emission abatement.

However, the countries with transitional economy are given certain flexibilities in meeting their targets.

➤ Annex – II: consists of 24 original OECD countries and the European Union (EU) which are included in Annex-I. This group has a special obligation to assist the developing countries with financial and technological resources.

➤ Non-Annex – I: comprises mainly developing countries. Their commitments depend on the financial resources and technology provided by the developed countries.

For participation in CDM, all countries are required to meet the following pre-requisites:

- Ratification of the Kyoto Protocol;
- Establishment of a National CDM Authority; and
- Willingness for voluntary participation in CDM.

In addition to the aforesaid pre-requisites, the developed countries should also comply with the following requirements as stipulated in the Protocol:

- National System for the estimation of GHG emissions;
- National registry and annual inventory;
- Accounting system for sale and purchase of emission reductions; and
- Establishment of assigned amount as per emission limitation and reduction commitment to reduce their overall GHG emission by at least 5 per cent below 1990 levels in the first commitment period of 2008-2012.

The eligibility criteria for the CDM projects include the following:

- The projects must be approved by all parties involved;
- The projects should promote sustainable development in host countries;
- The projects should result in real, measurable and long term benefits towards climate change mitigation; and
- The emission reduction should be additional to what would have otherwise occurred without the projects.

C. Institutional structure

The institutional structure created for implementation of CDM includes three new entities:

- Executive Board;
- Designated National Authority; and
- Designated Operational Entity.

1. Executive Board (EB)

To supervise the implementation of CDM, an Executive Board has been set up and it operates under the authority of the Parties. It is serviced by the UNFCCC Secretariat. The Executive Board consists of ten members, including one representative from each of the five official UN regions (Africa, Asia, Latin America and the Caribbean, Central and Eastern Europe and OECD), one representative from the small island developing countries and two representative each from developed and developing countries. The Executive Board maintains a CDM registry for issuance of “Certified Emission Reductions (CERs)”, management of account levied for administrative expenses and adaptation fund, and for keeping record of CER account for countries developing country participating in CDM projects. The Executive Board also accredits Designated Operational Entities (DOEs).

2. Designated National Authority (DNA)

Countries participating in CDM are required to identify Designated National Authority, usually a government Department to serve as a focal point for consideration and approval of CDM project proposals.

3. Designated Operational Entity (DOE)

The Designated Operational Entities will be authorized to validate the candidate project proposals and subsequently verify the emission reduction resulting from the projects which could be considered for issuance of CERs. The institutions willing to serve as operational entities are required to obtain accreditation from the Executive Board. For designation as operational entities, the applicant institutions/agencies should have necessary professional expertise and no conflict of interest with the project participants.

D. Financial modalities

The financial modalities for CDM projects may have a range of flexible approaches depending on the option chosen by the project proponents and investors. These include the following:

1. Unilateral funding

The project proponents may take sole responsibility of project design and implementation. They may mobilize their own resources for funding the projects and recover the investment with profit accruable from the sale of CERs. Thus, the project proponents will be allowed to own the CERs for sale depending on the market situation.

2. Bilateral funding

The project proponents may initiate the projects in collaboration with investors from developed countries through credit agreement or equity investment. In credit agreement, the investors can make advance payment for the CERs to be accrued from the projects. In equity investment, the investors can take equity shares in the projects including that of accruable CERs as also the profits or losses.

3. Multilateral funding

The investors from developed countries may collectively set up a CDM fund for investment in a number of CDM projects. The CERs credited to the fund and the benefits thereof could be distributed among the investors depending on their contributions to the fund.

4. Open-ended funding

In the open ended financing system, a mix of various funding options may be adopted. For instance, the investors and institutions in developing countries may set up national CDM fund. Alternatively, the developing countries on their own may set up CDM fund for supporting the CDM projects and sell the shares to the investors. Yet another option would be for a CDM fund to tie up with a major investor.

E. Share of proceeds

As per Kyoto Protocol, a share of the proceeds from certified project activities is used to cover the administrative expenses as well as to assist developing country parties that are particularly vulnerable to the adverse effect of climate change to meet the costs of adaptation (2 per cent of CER proceeds for adaptation).

F. Project approval and implementation procedures

The various steps involved in CDM project approval and the responsibilities of concerned entities and stakeholders are enumerated as follow:

1. Project design and formulation

The first step in the CDM project cycle is the preparation of a Project Design Document (PDD) on the candidate CDM project. It is formulated by the project proponents as per format prescribed by UNFCCC Secretariat. The document should provide the technical and financial details of project which include the purpose and a technical description of the project, proposed baseline methodology, estimated operational life time of the project, description of how the additionality requirements are met through the project, documentation on environmental impacts, sources of funding, stakeholders' comments and a monitoring plan.

2. National approval

The project design document is to be submitted to the Designated National Authority (DNA) of the host country. For seeking approval of the DNA, the project proponents have to ensure that the project design document contains relevant information and meet the requirements of the design template. The DNA is required to evaluate and issue a letter of approval with the confirmation as to how the project will help the host country to achieve sustainable development.

3. Validation

After approval of the DNA, the project design document needs to be validated by Designated Operational Entities (DOE) who are accredited by the Executive Board (EB). The role of an operational entity is similar to that of an auditor validating the financial statements. The process of validation involves review and assessment of the project design document including the baseline, methods computation for emission reduction and the monitoring plan. The operational entity has to first validate the project and subsequently verify the emission reduction for obtaining “Certified Emission Reduction (CERs)”. The operational entity also publishes the project design document for eliciting the comments of stakeholders. During the validation process, the operational entity reviews the project design document with specific reference to the prescribed requirements which include the following:

- Approval of the Designated National Authority;
- Eligibility of parties to participate in CDM;
- Eligibility of the project activity under CDM;
- Consideration of comments from stakeholders;
- Environmental impact assessment and results thereof;
- Conformity of the baseline with the principle of the Kyoto Protocol;
- Emissions reduction against the baseline as a result of the project; and
- Monitoring plan and methodologies.

4. Registration

Based on the validation report of the operational entity, the project is registered by the CDM Executive Board. However, the signatory countries may call for a review of the proposed registration.

5. Financing

Depending on the financing structure, financing methods may vary from project to project. Financing methods are to be decided by the project proponents and investors according to their needs.

6. Implementation and monitoring

Once the project design is approved and matters concerning financing modes are finalized, the project proponents can go ahead with implementation of the project and ensure that the performance is periodically monitored particularly for assessment of emission reduction as compared to the baseline. The monitoring plan which is an important component of the project design document should include the following:

- Information relating to data required for computing emissions from the project;
- Method of data collection including quality assurance;
- Method of computation of emission reduction from the collected data; and
- Selection of independent monitoring system.

7. Verification, certification and issuance of CERs

The emission reduction as calculated from monitoring of the project needs to be independently verified by the designated operational entity and compared with reference to the validated project design document. The operational entity is required to submit a verification report and certify the amount of emission reduction generated by the project for issuance of CERs by the CDM Executive Board. (Box: 2.2).

Box 2.2

Sequence of the CDM project cycle: actors and activities

Stage	Actors	Activities
1.	Project Proponent	Project design
2.	Host Country Designated National Authority (DNA)	Project approval
3.	Designated Operational Entity (DOE)	Validation of the project design document
4.	CDM Executive Board (EB)	Registration of the project
5.	Project Proponent	Project Implementation and Monitoring
6.	Designated Operation Entity (DOE)	Verification and certification of emission reduction from the project.
7.	CDM Executive Board (EB)	Issuance of Certified Emission Reductions (CERs)

III. ISSUES AND CHALLENGES

To ensure the potential of CDM as a market based instrument for encouraging investments from the developed countries and to stimulate the project proponents in developing countries, there are certain issues and challenges which need to be addressed. These relate to better understanding of the conceptual and technical issues, streamlining of procedures as also removal of the market barriers, some of which are enumerated in the following sections.

A. Market barriers

The CDM process involves market barriers and the transaction costs are too high while the potential benefits are uncertain. Another issue of concern arises from the apprehension that time required to fulfill the procedural requirements will be long and the payback for CERs will not be commensurate. Some of the measures which are required to streamline the system are:

- Establishment of Designated National Authority (DNA) is the first step for creating the CDM regime and sending clear message to the project proponents and potential investors regarding the national priorities and procedures.
- A clear and streamlined system for approval of CDM projects at the national level needs to be in position and the approval processes should specify the responsibilities of various organizations. Levels of approval should be kept to the minimum to avoid delays.
- Time schedules for each stage of the CDM process should be spelt out and it should not be unreasonably long.
- Transaction costs including the fees for approval and share of proceeds from CERs should not affect the profitability and viability of projects.

B. Sustainable development criteria

All CDM projects are required to meet the criteria of sustainable development. As such, the project proponents need to have a clear idea about the specific attributes which need to be incorporated in the project for seeking approval of their projects. General criteria or a set of guiding principles may create uncertainties and introduce subjectivity.

C. EIA criteria and stakeholder consultations

As per procedure laid down for the CDM, the project design document needs to include Environmental Impact Assessment (EIA). For preparation of EIA report, it is necessary to spell out the aspects which need to be dealt with in the EIA study. Requirements of EIA as per the existing system in different countries are not similar.

The CDM project approval process requires consultation with stakeholders at three stages. In the first stage, the project proponent is required to elicit stakeholders' comments on issues relating to local impacts. During the validation, the Designated Operating Entity (DOE)

is required to elicit the stakeholders' comments on the project design document. In the third stage, the Executive Board as a part of its approval process again seeks inputs from public/stakeholders. There is evidently a need for streamlining the process of consultations at different stages.

D. Baseline criteria

The CDM project approval process has introduced certain key issues like Baselines, Additionality, Project boundaries and leakage. These are essentially for achieving the desired emission reductions while pursuing the objective of sustainable development. If these issues are not duly understood and addressed, it may affect the CDM and in turn become a market barrier.

Establishment of a reliable baseline is one of the major tasks faced by the project proponents in developing countries. Often, they are not acquainted with the methodologies for estimation of baseline. The baseline for a project as defined for CDM activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed activity. The baseline needs to cover emissions from all gases, sectors and source categories as listed in Annex – A (of the Kyoto Protocol) within the project boundary. As approved by the Executive Board, the following methodologies will be applicable for estimation of baseline:

- Existing actual or historical emissions as applicable; or
- Emission from a technology that represents an economically attractive course of action taking into account the barriers to investment; or
- Average emissions of similar project activities undertaken in the previous five years in similar social, economic, environmental and technical circumstances and whose performance is among the top 20 per cent of their capacity.

The Executive Board is in the process of finalizing the baseline methodologies for different types of projects which will help the project proponents.

The Executive Board has approved some baseline methodologies for small-scale projects, and methodologies are being considered for regular CDM projects. The Executive Board has asked its expert panel on methodologies to make recommendations. These will probably follow the format of the panel's recommendations to the Executive Board for small scale projects, giving guidance on acceptable practice according to project type. The recommended small scale project guidance distinguishes between a number of project types, such as renewable energy projects, energy efficiency improvement projects, and other types of projects, and gives different guidance for a number of sub-types under each of these categories.

Uncertainties in baseline cannot be eliminated, because it is difficult to prove ‘what would have happened otherwise’. Baselines for CDM projects should:

- Be environmentally credible, to provide long-term benefits emissions reduction benefits;
- Be transparent and verified by a third party;
- Be simple and inexpensive to draw up (low transaction costs); and
- Provide a reasonable level of credit certainty for CDM investors.

There are trade-offs among these criteria. For example, if the baseline level is set higher than the emissions level that would happen otherwise, an artificially high number of emissions credits would be generated. This would mean that more projects would be eligible for CDM status and the cost of credits would be lower, but it would also increase the number of ‘free riders’. If, on the other hand, the project baselines are set lower than the emission levels that would happen otherwise, the emission credits per project would be small. The low baseline would limit the number of eligible projects, and may even disqualify some climate friendly projects.

E. Additionality criteria

Additionality criteria are introduced to check that credits are not given to such projects that would happen even without the CDM –called as ‘free rider’ credits. There are two types of additionality:

- Environmental additionally - real, measurable and long-term emission reductions that are additional to any reductions that would have occurred in the absence of the certified project activity.
- Financial additionality – funding for the CDM project must be additional to official development assistance, including contributions to the Global Environment Facility (GEF).

To meet the environmental additionality criteria, the project proponent has to explain the measures that reduce emissions, while excluding measures that would have been introduced anyway. One way to establish environmental additionality is to prove that the technology to be used is the best available under the circumstances and better than the typical technology. Technology comparisons can be made at local, national, and regional levels, against pre-established benchmarks.

Financial additionality, the second key requirement, implies that project financing has to be additional to funds already allocated by the investor country to official development assistance. The underlying principle is that CDM projects should not divert or decrease already scarce development aid. The financial additionality criteria include bilateral official development assistance and multilateral grant funding. The challenge in interpreting the financial additionality criteria is due to the fact that official development assistance from many developed countries is already reduced and it is difficult to ascertain whether money is being diverted. It is often pointed out that the financial additionality criteria should not apply to the financing of feasibility studies or to the monitoring and capacity building aspects of CDM projects.

F. Project boundaries and leakage

The Executive Board has defined leakage as the net change of anthropogenic emissions by sources of greenhouse gases which occur outside the project boundary, and which is measurable and attributable to the CDM project activity. Every project will have direct impacts, as well as indirect impacts – changes in emissions due to activities not under the control of the project managers. Thus, guidelines are needed on how widely to draw the boundaries of the project under consideration.

The concern is that we may draw project boundaries too narrowly – there will be pressure to do so from potential project participants, as it simplifies the calculation – and miss significant leakage effects. If, for example, we do not include the effect on submerged vegetation within the project boundary for a large hydro project, we may miss significant amount of methane emissions. To take another example, if we displace diesel generators with solar power in a CDM project should we be concerned about what happens to the generators? If they are used elsewhere (for example, to satisfy previously unfulfilled demand for energy), does this constitute leakage? DOEs are to monitor leakage, if it is significant and attributable, in their monitoring and verification processes.

The Executive Board is providing guidance on project boundaries and leakage for the special case of small-scale projects, which would be otherwise overstressed by complex requirement.

G. Return on investment

An important query which is often raised by the potential project proponents relates to the price of CERs as a result of their projects. During the project cycle, there are potential risks of price fluctuations from the projected level besides the possibility of not obtaining the expected CERs. It is reported that the prediction for price of carbon dropped for US \$ 10-20 per tonne of Carbon Dioxide since the United States of America decided to opt out of Kyoto Protocol ratification. The World Bank Prototype Carbon Fund has valued carbon at US \$ 3-5 per tonne of Carbon Dioxide. Since the CDM is still in a nascent stage, the market value of CERs is not likely to increase at least till the Protocol is in force with the ratification of countries as needed.

Another issue of concern is the high cost of penalties for failure to deliver the contracted amount of CERs. In some of the schemes, the penalties are prohibitively high which calls for a provision of insurance against such risk.

H. Financial and investment climate

The investment policy of countries may also affect the viability of CDM projects and edge over others. The financial regime, including their experience with foreign direct investment and financing systems (such as soft loans, grants etc) in the countries will be a prime mover for CDM investment. The financial and investment climate in the developing countries needs to be conducive to CDM investment. As enlisted by the United Nations (1999), the potential financial issues relating to the CDM include the following:

- Impact of host country investment policy on project viability and competitiveness;
- Availability of soft loans or grant for CDM projects;
- Use and impact of international and bilateral financial support;
- Ratio of domestic to international capitalization, debt-equity ratios, use of public sources of capital, export or import guarantees and the mitigation of risks; and
- Impact of project performance, political and currency risk on the viability and competitiveness of project financing.

I. Transaction costs

The CDM project cycle involves expenditure for various activities including the fees payable to different agencies. The project proponents are concerned about the availability of operational entities and the costs of hiring them. Most of the Designated Operational Entities (DOEs) are likely to be from the developed countries although applications are invited from all over the world for accreditation of DOEs by the Executive Board.

The World Bank Prototype Carbon Fund (PCF) has estimated the costs of carbon assets creation and maintenance costs on the basis of experience gained through the PCF funded projects. The various stages for which expenses are to be incurred include the following:

- Preparation and Review of the Project;
- Baseline study and Monitoring plan;
- Validation process;
- Negotiation of Project Agreement;
- Construction and start up; and,
- Periodic verification and certification.

J. Small projects

There is concern that small scale projects will have little or no market because of the high development costs, and the fact that these projects will be less cost effective and generate fewer CERs. To address these types of concerns, the Executive Board adopted simplified procedures for small scale projects, including the use of a simplified project design format, flexibility to bundle multiple small projects, permission to use the same operational entity for validation as well as certification and registration, unlike larger projects, and authorization to use a set of simplified methodologies for calculating baseline, project boundaries and leakage.

However, the concern persists that the costs of the process will still exceed the benefits for projects below a certain scale of activity. It remains to be seen whether the simplified modalities and procedures outlined by the Executive Board will adequately address this concern. (Box 3.1)

Box 3.1

Simplified procedure for small projects

For the small scale CDM projects, the Executive Board has simplified the project cycle, allowed bundling of projects and differentiated the registration fees depending on the project size. The types of small scale projects in respect of which simplified procedures have been laid down include the following:

- **Renewable energy** project activities with a maximum output capacity equivalent of up to 15 MW (or an appropriate equivalent);
- **Energy efficiency** improvement project activities which reduce energy consumption, on the supply and/or demand side, by upto the equivalent 15 GWh per year;
- **Other project activities** that reduce anthropogenic emissions by sources and directly emit less than 15 kt of CO₂ equivalent annually.

IV. OPPORTUNITIES FOR ASIA AND THE PACIFIC

A. New vistas

The challenges posed by the threat of climate change have also opened up multiple opportunities in terms of policy interventions, new initiatives, technology absorption, economic instruments and cooperation at the national, regional and global levels. The CDM, being a cooperative financial mechanism, has the potential to play a pivotal role in ushering the desired goal of climate change mitigation and sustainable development along with attendant benefits. The CDM can serve the interest of both the developed and developing countries. The developed countries have the opportunities for investment in developing countries for emission reduction projects at lower cost and get the credit thereof. On the other hand, the developing countries can avail the opportunities of supplementing their resources to meet the development needs and in the process contribute towards the common goal of GHG reduction.

For the developing countries in Asia and the Pacific, the over-arching priority is to achieve economic growth for meeting the basic human needs. It will necessarily require increased production and access to energy as also economic services for income generation and employment avenues. While the conventional methods of development have triggered a plethora of environmental problems including the threat of climate change, the CDM offers opportunities to adopt environmentally compatible mode of the development. While contributing towards the global goal of emission reduction, the CDM holds the promise for environmental and social gains in the developing countries through abatement of local environmental problems and associated social benefits. Hence, emission reduction activities and development pursuits could be mutually complementary. Participation of the public as well as private sectors for investment and technology transfer in emission abatement projects offers the much needed opportunities to the developing countries to replace the inefficient technologies and launch new initiatives for sustainable production and use of energy – a key component for economic growth. Unlike the conventional projects where investment is made primarily for financial returns, the CDM projects are expected to result in carbon credits as well as other environmental and social benefits in addition to financial returns. Besides, equity investment and debts in case of conventional projects, CDM projects have the added advantage of attracting ‘carbon investment’ for reduction of emissions.

B. Candidate sectors for CDM projects

The important sectors which have potential for CDM projects in developing countries include the following:

- Agriculture
- Buildings (residential, commercial and government buildings)
- Energy generation, distribution and use
- Forestry
- Industry and manufacturing activities
- Mining
- Transport
- Waste Management

For the first commitment period (2008-2012), afforestation and reforestation activities have been enlisted for CDM recognising that the forests can serve as 'carbon sinks'. Therefore, forestry belongs to a different category unlike other sectors which are major GHG emitters due to fuel consumptions. Emission control activities of varied nature in different sectors are the potential candidates for CDM projects. Some of these activities as pilot projects have been already undertaken in different countries of the ESCAP region through the Activities Implemented Jointly (AIJ), a precursor of the CDM. Several technological options are available for GHG mitigation in different sectors and the opportunities could be best availed through appropriate mix of policy initiatives and cooperative endeavours at different levels. Reduction of Methane and Nitrous Oxide emission in industrial activities, energy efficiency and energy conservation system, switch over to cleaner fuels and development of renewable energy sources are among the potential candidates for CDM projects. (Box 4.1).

Box 4.1
Potential CDM projects in different sectors

Sectors	Potential Projects/Activities
Agriculture	<ul style="list-style-type: none"> • Improvement in cultivation practices to reduce methane emissions. • Reduction of energy use through demand side management. • Improvement in use of agrochemicals (fertilizers and pesticides).
Buildings (residential, commercial and government)	<ul style="list-style-type: none"> • Energy efficient design of buildings. • Energy efficient appliances. • Energy conservation measures. • Fuel switching in households and commercial boilers. • use of renewable energy sources.
Energy (nuclear energy excluded from CDM)	<ul style="list-style-type: none"> • Development of renewal energy sources (hydro, solar, wind and biomass). • Clean coal technologies (e.g. coal beneficiation). • Fuel substitution measures. • Improvement in transmission and distribution network. • Reduction of leakage in transport, handling and distribution of oil and gas.
Forests	<ul style="list-style-type: none"> • Afforestation & Reforestation.
Industry and Manufacturing	<ul style="list-style-type: none"> • Energy conversion and energy efficiency measures. • Process modifications requiring lesser and emission generation. • Change of feedstock in boilers (e.g. coal to gas).
Mining	<ul style="list-style-type: none"> • Coal bed methane recovery and reduction of methane emissions. • Control of fires in mines. • Energy efficient systems.
Transport	<ul style="list-style-type: none"> • Introduction of alternate fuels (e.g. biofuel). • Switch over to cleaner fuels. • Fuel efficiency measures. • Improvement in public transport. • Urban Planning and traffic management.
Wastes	<ul style="list-style-type: none"> • Landfill gas recovery and use. • Waste to energy conversion activities.

C. Capacity-building for the CDM: national and regional initiatives

Several countries of Asia and the Pacific have taken proactive initiatives at the national level for availing the opportunities of CDM. They relate to the following:

- Development of national strategy for implementation of CDM (example: Indonesia, Thailand and Vietnam).
- Launching of National Communication (NATCOM) and website for dissemination of information on national activities concerning climate change;
- GHG emission inventories;
- Uncertainty reduction in GHG emission;
- Vulnerability assessment and adaptation strategies;
- Targeted research activities; and
- Identification of policies and programmes for sustainable development and implementation of the Climate Change Convention.

Some countries in the region have taken initiatives for policy shifts in energy sector through cleaner fuel and cleaner fuel technologies, inter-fuel substitutions, increased share of renewable energy in the commercial energy supply system, energy efficiency and energy conservation measures. For instance, in Thailand, the introduction of economic instruments have saved 295 MW of peak demand and reduced Carbon Dioxide emissions by more than 1 million tonne with resultant savings of US \$ 100 million per year. Renewable energy projects and energy efficiency activities have been undertaken in China, India, Indonesia, Kazakhstan, Lao PDR, Malaysia, Mongolia, the Philippines and Sri Lanka. In Malaysia, the Government has introduced economic incentives for energy conservation and energy efficiency activities. In Japan, several companies have taken voluntary action for emission control which aim at achieving stricter standards than the national ones. In India, energy audit system has been introduced for saving the energy consumption in various establishments.

At the regional level, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in association with the concerned organizations has been playing a catalytic role in climate change related activities since 1993. UNESCAP has also collaborated in a number of regional projects on climate change including the Regional Study on Global Environmental Issues funded by the Asian Development Bank (ADB), the Annual Asia-Pacific Seminars on climate change sponsored by the Environment Agency of Japan, the Asia Least-Cost Greenhouse Gas Abatement Strategy (ALGAS) project funded by ADB and the Global Environment Facility (GEF).

More recently, ESCAP has been involved in implementation of two regional programmes relevant to the objectives of the Climate Change Convention. These are:

- Regional Action Programme on Environmentally Sound and Sustainable Development 2001-2005, adopted by the Ministerial Conference on Environment and Development in Asia and the Pacific 2000, has been designed to take an action-oriented and focused approach to address areas of priority concern, including, among others, climate change and sustainable energy, desertification and land degradation. The climate change component of this programme aims to assess the socio-economic impacts of climate change, in particular the vulnerability of small island States and low lying coastal areas, and to make

serious efforts towards the implementation process of the UNFCCC and its Kyoto Protocol. The energy component aims to enable governments and concerned stakeholders to develop sustainable energy plans in a strategic manner and manage such plans in order to ensure minimum impact on the environment and equitable access to clean and affordable energy.

➤ Sustainable Energy Development Action Programme, Strategies and Implementation Modalities for the Asian and Pacific Region, 2001-2005, adopted by the High Level Regional Meetings on Energy for Sustainable Development (November 2000 in Bali, Indonesia), further elaborates the energy component of the Regional Action Programme on Environmentally Sound and Sustainable Development 2001-2005. It aims to assist the countries in the region in attaining a sustainable energy path by (a) strengthening their planning capacity in various energy sectors (b) promoting application of supply and demand side energy efficiency (c) promoting application of renewable energy technologies (d) mobilizing financial resources from both the traditional sources and private sector (e) developing policy for promoting clean and affordable energy utilization for poverty alleviation, especially in rural areas.

The above mentioned programmes contain priority areas, specific short and long-term activities, strategies and implementation modalities to be undertaken at the national, sub-regional and regional levels. In particular, strengthening of the institutional, technical, analytical, policy and planning and human capacity in various areas is one of the major focuses, especially for least developed and small island developing countries.

D. Way forward: priority action points

Based on the enabling activities initiated for implementation of the Climate Change Convention and with the new vistas of opportunities opened through the CDM, it should be possible to take aggressive measures to fill up the gaps and to meet the needs. These relate to the following:

- GHG inventories at the national, sub-regional and regional level;
- Least-cost abatement measures;
- Development and implementation of ‘win-win’ projects;
- Administrative and legislative measures;
- Assessment of vulnerability and adaptation;
- Public awareness and participation of stakeholders;
- Dissemination and exchange of information;
- National and regional policy level consultation; and,
- Provision for regional and international clearing house activities.

The priority action points in regard to capacity enhancement for development and implementation of CDM projects will include the following:

- Development of national CDM strategies;
- Designation of focal points for CDM projects;
- Enlistment of national CDM project priorities;
- Preparation of guidance manual for potential project proponents;

- Preparation of a repository of project profiles at the national, sub-regional and regional level;
- Dissemination of information on investment opportunities for the potential investors and project proponents;
- Technical and financial assistance where needed for project design document;
- Sensitization of stakeholders regarding implication of CDM and projects thereto;
- Assessment of market opportunities for CDM projects; and
- Assistance for bunching of projects and attracting investment on a sectoral basis to ensure viability of small projects.

The nature and extent of benefits which may be accrued from the CDM projects will not only depend on the ratification of the Protocol for its enforcement but also on the CDM friendly investment climate which will require concerted and cooperative efforts at the national, regional and global levels. Thus, CDM can turn out to be a Collective Development Mechanism.

It may take sometime to have the CDM activities fully operational. Till such time and even thereafter, the opportunities for providing technical and financial help for formulation and implementation of CDM related projects through sub-regional and regional institutions need to be devised.

ANNEXES

Annex I

FORMAT FOR THE PROJECT DESIGN DOCUMENT

(website : <http://cdm.unfccc.int>)

A project design document shall include the following:

(a) A description of the project comprising the project purpose, a technical description of the project, including how technology will be transferred, if any, and a description and justification of the project boundary;

(b) A proposed baseline methodology in accordance with the annex on modalities and procedures for a CDM including, in the case of the:

- (i) Application of an approved methodology:
 - Statement of which approved methodology has been selected;
 - Description of how the approved methodology will be applied in the context of the project.
- (ii) Application of a new methodology:
 - Description of the baseline methodology and justification of choice, including an assessment of strengths and weakness of the methodology;
 - Description of key parameters, data sources and assumptions used in the baseline estimate, and assessment of uncertainties;
 - Projections of baseline emissions;
 - Description of how the baseline methodology address potential leakage.
- (iii) Other considerations, such as a description of how national and/or sectoral policies and circumstances have been taken into account and an explanation of how the baseline was established in a transparent and conservative manner.

(c) Statement of the estimated operational lifetime of the project and which crediting period was selected;

(d) Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity;

(e) Environmental impacts;

- (i) Documentation on the analysis of the environmental impacts, including transboundary impacts;
- (ii) If impacts are considered significant by the project participants or the host Party: conclusions and all reference to support documentation of an environmental impact assessment that has been undertaken in accordance with the procedures as required by the host Party.

(f) Information on sources of public funding for the project activity from Parties included in Annex I which shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties;

(g) Stakeholders' comments, including a brief description of the process, a summary of the comments received, and a report on how due account was taken of any comments received;

(h) Monitoring plan:

- (i) Identification of data needs and data quality with regard to accuracy, comparability, completeness and validity;
- (ii) Methodologies to be used for data collection and monitoring including quality assurance and quality control provisions for monitoring, collecting and reporting;
- (iii) In the case of a new monitoring methodology, provide a description of the methodology, including an assessment of strengths and weakness of the methodology and whether or not it has been applied successfully elsewhere.

(i) Calculations:

- (i) Description of formulae used to calculate and estimate anthropogenic emissions by sources of greenhouse gases of the CDM project activity within the project boundary;
- (ii) Description of formulae used to calculate and to project leakage, defined as: the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the CDM project activity boundary, and that is measurable and attributable to the CDM project activity;
- (iii) The sum of (i) (ii) above representing the CDM project activity emissions;
- (iv) Description of formulae used to calculate and project leakage;
- (v) Description of formulae used to calculate and to project leakage;
- (vi) The sum of (iv) and (v) above representing the baseline emissions;
- (vii) Difference between (vi) and (iii) above representing the emission reductions of the CDM project activity.

(j) Reference to support the above, if any.

Annex II

CLIMATE-RELATED PROJECTS THROUGH ACTIVITIES IMPLEMENTED JOINTLY (AIJ) IN THE ESCAP REGION

The pilot phase for Joint Implementation, as defined in Article 4.2(a) of the United Nations Framework Convention on Climate Change, that allows for project activity among developed countries (and their companies) and between developed and developing countries (and their companies). AIJ is intended to allow Parties to the United Nations Framework Convention on Climate Change to gain experience in jointly implemented project activities. There is no crediting for AIJ activity during the pilot phase.

Several climate related projects through AIJ have been undertaken in different countries. These include projects for renewable energy (wind, hydropower and solar energy), waste-to-energy, energy efficiency and biomass. Some of these projects are also undertaken in countries of Asia and the Pacific. An illustrative list of such projects is given as follows:

China

➤ **Combined Heat and Power (CHP) Project in Shangqin Thermal Power Plant in Henan Province.**

This is to replace 24 low efficiency small coal fired boilers with new Circulating Fluidised Bed Combustion Boilers (CFBC) in conjunction with co-generating units. It will save 965 TJ of coal per year and result in emission reduction of 88 Kt of Carbon Dioxide per year. Alongside, it will also reduce local pollution due to lesser emission of Sulphur Dioxide (SO₂) and Oxides of Nitrogen which would have otherwise occurred.

India

➤ **DESI Power: Biomass gasification**

This project is for construction of small power plants using locally available biomass. It will replace the use of fossil fuels and explore the possibilities of using locally available biomass which is a renewable source. The project is supported by the Government of Netherlands.

➤ **Hybrid Renewal Energy Project**

This project is for development of solar steam cooking system for 10,000 people in Rajasthan district. With the abundance of solar energy in the area, it could provide a renewable and decentralized system of energy supply with attendant benefits of emission reduction which would have occurred if fossil fuels are to be used. The project is undertaken in collaboration with Australia.

➤ **Agricultural Energy Demand Side Management**

The project is for increasing the efficiency of energy distribution network for meeting the energy demand of agricultural firms in Andhra Pradesh. The project is implemented by the Andhra Pradesh State Electricity Board with the assistance of the World Bank and the Government of Norway.

Indonesia

➤ Renewable Energy Supply Systems

This is for installation of renewable energy based energy supply systems (solar heating, photovoltaic cells, micro hydro and wind turbine). It is expected to reduce emissions to the tune of 1230 tonnes of Carbon Dioxide equivalent per year. The project is undertaken in East Nusa Tenggara and South Sulawesi.

➤ Paper Sludge and Solid Waste Recycling for Steam Generation

In this project, the paper and solid wastes will be subjected to incineration to produce energy for steam generation. It is to reduce 91,000 tonnes of Carbon Dioxide emission which would have occurred in the conventional process. It is also to help in useful management of waste. The Project has been jointly implemented by the Ministry of Industry and Trade (MOIT), Government of Indonesia with the Japanese collaboration at Fajar Surya, Wisesa, Bekasi, West Java.

➤ Hybrid Energy Power

This project with the Australian collaboration is for design and installation of solar/diesel hybrid power system in 14 villages of South Sulawesi. It is expected to curtail emission of 1046 tonnes of Carbon Dioxide equivalent per year.

➤ Renewable Energy Training/Demonstration Project

The project was undertaken with the Australian collaboration at Kemiri, Irian, Jaya (Papua). It is for emission reduction of 64 tonnes of Carbon Dioxide per year through installation of renewable energy systems (solar heating, mini hydro, hybrid system).

➤ Reduction of GHG through Landfill resource Recovery

It is for provision of a demonstration system to capture and utilize methane from landfill site to generate electricity for use at the landfill site. It is expected to reduce emission of the order of 4790 tonnes of Carbon Dioxide per year. The project is implemented in collaboration with Australia.

Viet Nam

➤ Energy Efficiency Measures in Industrial Boilers

The project funded through the Asia Least-cost Greenhouse Gas Abatement Strategy (ALGAS) is for improvement in performance of industrial boilers. It is expected to reduce 150 kilotonnes of Carbon Dioxide emission per year besides resulting in reduction of air pollutants like Sulphur Dioxide and Oxides of Nitrogen.

GLOSSARY

Activities Implemented Jointly (AIJ): The pilot phase for Joint Implementation, as defined in Article 4.2(a) of the United Nations Framework Convention on Climate Change, that allows for project activity among developed countries (and their companies) and between developed and developing countries (and their companies). AIJ is intended to allow Parties to the United Nations Framework Convention on Climate Change to gain experience in jointly implemented project activities. There is no crediting for AIJ activity during the pilot phase. A decision remains to be taken on the future of AIJ projects and how they may relate to the Kyoto Mechanisms.

Afforestation: The process of setting up a forest, especially on land that was not a forest earlier.

Anthropogenic Emissions: Emissions of Greenhouse gases associated with human activities. These include burning of fossil fuels for energy, deforestation and land-use changes.

Assigned Amounts (AAs): Under the Kyoto Protocol, the total amount of greenhouse gas emission that each Annex B country has agreed that its emissions will not exceed in the first commitment period (2008 to 2012) is the assigned amount. This is calculated by multiplying the country's total greenhouse gas emission in 1990 by five (for the 5 year commitment period) and then by the percentage it agreed to as listed in Annex B of the Kyoto Protocol (e.g. 92% for the European Union, 93% for the USA).

Baseline Approach: A baseline approach is the basis for baselines methodology. The Executive Board agreed that following three approaches will be applicable in CDM project activities:

- Existing actual or historical emission as applicable; or
- Emission from a technology that represents an economically attractive course of action taking into account barriers to investment; or
- Average emissions of similar project activities undertaken in previous five years in similar social, economic, environmental and technical circumstances and whose performance is among the top 20 per cent of their capacity;

Crediting Period: The crediting period for a CDM project activity is the period for which reductions from baseline are verified and certified by a designated operational entity for the purpose of issuance of Certified Emission Reductions (CERs). Project participants shall choose the starting date of a crediting period from the date the first emission reductions are generated by the CDM project activity. A crediting period shall not extend beyond the operational lifetime of the project activity. The project participants may choose between two options for the length of a crediting period: (i) fixed crediting period or (ii) renewable crediting period.

For the “Fixed Crediting Period”, a single crediting period may be of maximum seven years. For “Renewable Crediting Period” the crediting period may be renewed at most for two times (maximum 21 years) provided for each renewal, Designated Operational Entity determines whether the original project baseline is still valid or has been updated, taking into account of new data, where applicable.

Certification: Certification is the written assurance by the designated operational entity that during a specified time period, a project activity achieved the reductions in anthropogenic emission by sources of greenhouse gases as verified.

Certified Emission Reduction (CERs): It is a unit issued by the Executive Board based on recommendations of the Designated Operational Entity. It is equal to one metric tonne of carbon dioxide calculated on the basis of global warming potential.

Climate Change: According to the definition of UNFCCC, is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability over comparable time period.

Conference Of Parties (COP): The supreme body of the United Nations Framework Convention on Climate Change (UNFCCC), comprised countries that have ratified or acceded to the framework Convention on Climate Change. The first session of the Conference of Parties (COP-1) was held in Berlin (1995), COP-2 in Geneva (1996), COP-3 in Kyoto (1997), COP-4 in Buenos Aires (1998), COP-5 in Bonn (1999), COP-6 in Hague (2000), COP-7 in Marrakech (2001) and COP-8 in New Delhi (2002).

Global Warming Potential (GWP): An index, describing the radiative characteristics of well-mixed greenhouse gases, that represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing infrared radiation. This index approximates the time-integrated warming effect of a unit mass of a given greenhouse gas in today’s atmosphere, relative to that of Carbon Dioxide.

Leakage: Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary and which is measurable and attributable to the CDM project activity.

Project Boundary: The project boundary encompasses all anthropogenic emissions by sources of greenhouse gases, under the control of the project participants, that are significant and reasonably attributable to CDM project activity.

Registration: It is a formal acceptance by the Executive Board of a validated project activity as a CDM project activity. Registration is a pre-requisite for verification, certification and issuance of CERs.

Stakeholders: Individuals, groups or communities affected or likely to be affected by the proposed CDM project activity or actions leading to the implementation of such an activity.

Validation: It is a process of independent evaluation of project activity by a Designated Operational Entity against the requirements of the CDM on the basis of the Project Design Document.

Verification: Periodic independent review and determination of monitored reduction in anthropogenic emission of greenhouse gases as a result of the registered CDM project activity during the verification period.

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